IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:
Serial Number: Group Art Unit:
Filed: Examiner:
For:

DECLARATION UNDER 37 CFR 1.132

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Hiroki Edo, a citizen of Japan, hereby declare and state:

CITIZENSHIP

I have a degree in energy engineering master which was conferred by Muroran Institute Technology in Hokaido Japan, in 1988.

I was employed by Sankyo Engineering CO., LTD (current S.E.S. CO., LTD) in 1992 and I had 6 years of development work in Semiconductor Cleaning Equipment. Then, I was assigned to Technology Department in S.E.S. CO., LTD and have had a total of 5 years of intellectual property work regarding above equipment since 1998.

I am a member of The Japan Society of Science.

My publications include the following works in this field:
Semiconductor World (Monthly) Vol.3, 1995, and my public appearances include speaking on Non before Non.

ANY OTHER QUALIFICATIONS APPLICABLE

I am familiar with the Advisory Action dated June 20, 2003, and the art cited therein, particularly U.S. Patent No. 4,544,446 to Cady.

The present invention is characterized in that, as shown in Figures 4(A)-4(C) of the present specification, the gas flow supplied at the outer peripheral portion of the wafer surface is larger than at the center thereof.

As a perfectly uniform fluid does not exist, the gas flow on a wafer surface is generally non-uniform. My analysis of the gas flow in Cady's apparatus is shown in attached Figure A. This analysis is based on our years of study of this sort of

apparatus. In attached Figure A, both fast-flowing region a_1 and slow-flowing region B are spontaneously generated on the wafer surface. Further, the velocity of flow increases toward the periphery in the fast-flowing region and, in the slow-flowing region, the direction of flow (symbol b_1) is opposite to the general flow direction a_1, to cling to the fast-flowing region.

As noted above, this phenomenon has been confirmed by years of study by us and is related to "Rayleigh-Taylor instability", a well known phenomenon in fluid mechanics.

Consequently, in the slow-flowing region B, the flow b_2, which is directed to the inside of the wafer from the outside, is generated, according to Bernoulli's Law. As the flow b_2 includes air, oxygen in the air may interfere with the prevention of oxidization of the wafer surface.

Therefore, Cady's apparatus cannot inherently meet the gas flow of claim 1 of the present invention. Figures 4(A)-4(C) in the present specification are embodiments of the present invention that meet the limitation of claim 1. As a result of the present invention supplying more gas to the region corresponding to region B in Figure A, the gas flow shown in attached Figure B is obtained.

In Cady's Figures 6-8B, the gas flow is similar to attached Figure A and Cady's apparatus does not appear to be able to obtain the gas flow limitations of present claim 1. Cady's figures cannot be interpreted as showing that more gas is supplied toward the peripheral portion of the wafer surface than at the center thereof.

The undersigned declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed this 30th day of September, 2003

Nisoki Edo

Figure A

The gas flow in case the gas is supplied from an orifice uniformly.

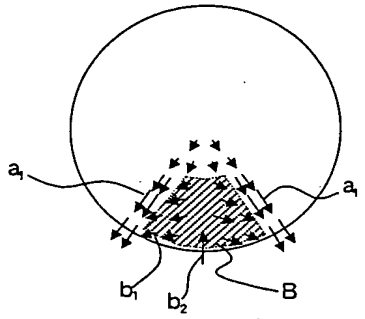

Figure B

The gas flow in claim 1 in the present invention.